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EXAMINER	
BUCHANAN, JACOB	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/563,290	BURCHARDT, TRYGVE	
	Examiner	Art Unit	
	Jacob Buchanan	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 April 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *26-69* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *26-69* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 April 2010* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *13/30/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office action addresses pending claims 26-69. Claims 1-25 were cancelled and claims 26-69 were added in the amendment mailed 4/13/2009.

Information Disclosure Statement

2. The information disclosure statements filed 6/15/2006 and 5/9/2008 fail to comply with 37 CFR 1.98(a)(3) because they do not include a concise explanation of the relevance of the documents "Amended Response to… Chinese", "Office Action for Norwegian", "Response to... Chinese Application... September 19, 2008", "Response to... Chinese Application... December 3, 2007", and "Response to... Chinese Application... May 29, 2008", as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language. It has been placed in the application file, but the documents listed above have not been considered.

The document listed above has not satisfied the requirement for including a concise explanation of the relevance, such as submitting an English-language version of the search report or action which indicates the degree of relevance found by the foreign office. The document is not in English and a translation has not been provided to the examiner. The examiner cannot consider them because he cannot ascertain how specific the information contained therein relates to the claimed invention. See MPEP 609.04(a).

Claim Objections

3. Claim 31 objected to because of the following informalities: the recitation of the second "agglomerating comprises" in section of "wherein said agglomerating comprises agglomerating comprises" appears to be erroneous. Appropriate correction is required.

4. Claim 42 objected to because of the following informalities: the recitation of "comprising adding PTFE particles having particle sizes less than 1 mm the first powder mixture" is unclear. Is the intention that the PTFE particles are less than 1 mm and are added to the first powder? Appropriate correction is required. For the purpose of this office action, the claim has been interpreted as reciting "adding PTFE particles having particle sizes less than 1 mm to the first powder mixture".

Claim Rejections - 35 USC § 102 / 103

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 26-27, 36, 45, 48, 54, and 61-66 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Takuya et al. (JP 07-220734, see machine translation) in evidence of Sauer (US 4,336,217).

Regarding **claim 26,** Takuya discloses a method of manufacturing a gas diffusion electrode **(see English abstract)** comprising:

- Forming an active layer by agglomerating a first powder mixture with PTFE particles in a dry form to produce a first dry agglomerate, adding a first organic solvent to the first dry agglomerate to produce a first paste, and calendering *(rolling method)* the first paste to form the active layer **([0017], see "reaction layer")**;
- Forming a gas diffusion layer by agglomerating a second powder mixture with PTFE particles in a dry form to produce a second dry agglomerate, adding a second organic solvent to the second dry agglomerate to produce a second paste, and calendering the second paste to form the gas diffusion layer **([0017], see "gaseous diffusion layer")**;
- Pressing the active layer with the gas diffusion layer and a current collector *(metal thin film 2)* to form a gas diffusion electrode **([0018])**

Further, Takuya, in **[0017]**, teaches the powder mixture and PTFE particles to be the same as, or an obvious variant of the powder mixture and PTFE used in a dry form as there is no mention of dispersion or heating to remove a liquid. Sauer further provides evidence that a powder mixture and PTFE particles are known to be mixed in the dry form **(see (C1/L63-68)**.

Regarding **claim 45,** Takuya discloses a method of producing manufacturing a gas diffusion electrode **(see English abstract)** comprising:

- Forming an active layer and a separate gas diffusion layer using separate processes that each comprise agglomerating a powder mixture with PTFE particles in a dry form to produce a dry agglomerate, adding a organic solvent to the dry agglomerate to produce a paste, and calendering *(rolling method)* the first paste to form the active layer **([0017], see "reaction layer" and "gaseous diffusion layer")**;
- Combining the active layer with the gas diffusion layer with a current collector *(metal thin film 2)* to form a gas diffusion electrode **([0018])**

Further, Takuya, in **[0017]**, teaches the powder mixture and PTFE particles to be the same as, or an obvious variant of the powder mixture and PTFE used in a dry form as there is no mention of dispersion or heating to remove a liquid. Sauer provides evidence that a powder mixture and PTFE particles are mixed in the dry form **(see (C1/L63-68)**.

Regarding **claims 27 and 48,** Takuya additionally discloses the method wherein the steps of forming an active layer and forming a gas diffusion layer are performed in parallel prior to the step of pressing the active layer with the gas diffusion layer **([0017])**.

To clarify, Takuya discloses preparing a reaction layer and a gaseous diffusion layer and then these layers are laminated together. Therefore, Takuya appears to disclose forming the active layer and the gas diffusion layer in parallel.

Regarding **claims 36 and 54**, Takuya additionally discloses the method wherein said adding a first organic solvent comprises stirring the first dry agglomerate during the addition of the organic solvent **([0017], see "solvent naphtha was mixed")**.

Regarding **claim 42**, Takuya additionally discloses the method further comprising adding PTFE particles having particle sizes less than 1 mm to the first powder mixture before said agglomerating **([0017])**.

Regarding **claim 61**, Takuya discloses gas diffusion electrode comprising a gas diffusion layer and an active layer *(reaction layer)* **([0017])**.

Regarding limitations cited in claim 61, which are directed to a method of making said gas diffusion electrode (e.g. " the gas diffusion layer and the active layer each formed from a paste created from a mixture of a powder mixture and PTFE particles and being manufactured in separate processes that each comprise agglomerating a powder mixture with PTFE particles in a dry form to produce a dry agglomerate, adding an organic solvent to the dry agglomerate to produce a paste, and calendering the paste"), it is noted that said limitations are not given patentable weight in the product claims. Even though a product-by-process is defined by the process steps by which the product is made, determination of patentability is based on the product itself and does not depend on its method of production. *In re Thorpe*, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). As the court stated in Thorpe, 777 F.2d at 697, 227 USPQ at 966 (The patentability of a product does not depend on its method of production. In re Pilkington, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969). If the product in a product-by-process claim is the same or obvious as the product of the prior art, the claim is unpatentable even though the prior art product was made by a different process.). See MPEP 2113 and 2114. Therefore, since the gas diffusion electrode as recited in claim 61 is the same as the gas diffusion electrode disclosed by Takuya, as set forth above,

the claim is unpatentable even though the gas diffusion electrode of Takuya was made by a different process. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

Regarding **claim 62**, Takuya discloses all of the claim limitations as set forth above. Takuya additionally discloses the gas diffusion electrode further comprising a current collector **([0018], see "metal plate")**.

Regarding limitations cited in **claims 63-66**, which are directed to a method of making said gas diffusion electrode, it is noted that said limitations are not given patentable weight in the product claims. Even though a product-by-process is defined by the process steps by which the product is made, determination of patentability is based on the product itself and does not depend on its method of production. *In re Thorpe*, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). As the court stated in Thorpe, 777 F.2d at 697, 227 USPQ at 966 (The patentability of a product does not depend on its method of production. In re Pilkington, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969). If the product in a product-by-process claim is the same or obvious as the product of the prior art, the claim is unpatentable even though the prior art product was made by a different process.). See MPEP 2113 and 2114. Therefore, since the gas diffusion electrode as recited in claims 63-66 is the same as the gas diffusion electrode disclosed by Takuya, as set forth above, the claim is unpatentable even though the gas diffusion electrode of Takuya was made by a different process. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

Claim Rejections - 35 USC § 103

8. The text of those sections of Title 35, U.S. Code not included in this section can be found above of the Office action.

9. Claims 28, 32, 34, 38, 46-47, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takuya et al. (JP 07-220734, see machine translation), as applied to claims 26 and 45 above, and further in view of Sauer (US 4,336,217).

Regarding **claims 28 and 49**, Takuya discloses all of the claim limitations as set forth above, but the reference does not explicitly disclose the method wherein forming an active layer and forming a gas diffusion layer are each performed in continuous processes.

Sauer discloses a method of manufacturing a plastic bonded active carbon layer for thin gas diffusion electrodes **(C1/L5-8).** The method includes subjecting a dry mixture of active carbon and PTFE powder in a paddle mixture (1), prior to rolling and pressing, additionally to the intensive subdividing effect of rapidly rotating sharp knives (6) of a blender **(C1/L63-68)**. Sauer additionally teaches that the process of forming the layer is a continuous process **(see Fig 2)**.

Sauer and Takuya are analogous because they are concerned with the same field of endeavor, namely the manufacture of fuel cell electrodes.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the continuous process of making a layer of Sauer with the process of Takuya for the purpose of making an uninterrupted process.

Regarding **claim 32**, Takuya discloses all of the claim limitations as set forth above. While the reference discloses mixing the powder mixture and PTFE together **([0017])**, the reference does not explicitly disclose the method wherein said agglomerating comprises using a blender with blades rotating at between 1,000 and 3,000 rpm.

Sauer discloses a method of manufacturing a plastic bonded active carbon layer for thin gas diffusion electrodes **(C1/L5-8).** The method includes subjecting a dry mixture of active carbon and PTFE powder in a paddle mixture (1), prior to rolling and pressing, additionally to the intensive subdividing effect of rapidly rotating sharp knives (6) of a blender **(C1/L63-68)**. The rate of rotation of a motor **(7)** driving the knives **(6)** is disclosed of reaching a rate of rotation equal to about 3000 rpm **(C2/L27-30).**

Sauer and Takuya are analogous because they are concerned with the same field of endeavor, namely the manufacture of fuel cell electrodes.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine the blender with blades for mixing and grinding, as taught by Sauer, with the method of mixing an agglomeration of powders, as taught by Takuya, for the purpose of grinding and mixing powders together. Furthermore, as the reference is not limited to any specific examples of mixing and as blenders with blades were well known in the art at the time the invention was made, as evidenced by Sauer, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use any mixing device, including the blender with blades in the device of

Sauer. Said combination would amount to use of a known element for its intended use in a known environment to accomplish entirely expected result.

Regarding **claim 34**, modified Takuya discloses all of the claim limitations as set forth above. Sauer additionally discloses the method characterized in that an agglomeration time of at least 1 minute is used **(C2/L34-39).**

Regarding **claim 38**, Takuya discloses all of the claim limitations as set forth above, but the reference does not explicitly disclose the method wherein said pressing the active layer and the gas diffusion layer and a current collector.

Sauer discloses a method of manufacturing a plastic bonded active carbon layer for thin gas diffusion electrodes **(C1/L5-8)**. Sauer additionally discloses calendering a current collector with the gas diffusion electrode **(Fig 2, C2/L54-56)**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the calendering step of Sauer with the method of manufacturing gas diffusion electrodes of Takuya for the purpose of enabling a continuous manufacture of the said gas diffusion electrodes.

Regarding **claims 46-47**, Takuya discloses all of the claim limitations as set forth above, but the reference does not explicitly disclose the method wherein the step of combining the active layer and the gas diffusion layer with a current collector comprises calendering the current collector with the gas diffusion layer and then combining the gas diffusion layer with the current collector, nor the method wherein the step of combining the gas diffusion layer with the current collector comprises calendering the gas diffusion layer and the current collector.

Sauer discloses a method of manufacturing a plastic bonded active carbon layer for thin gas diffusion electrodes **(C1/L5-8)**. Sauer additionally discloses calendering a current collector with the gas diffusion layer **(Fig 2, C2/L54-56)**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the calendering step of Sauer with the method of manufacturing gas diffusion electrodes of Takuya for the purpose of enabling a continuous manufacture of the said gas diffusion electrodes.

10. Claims 29, 39, 50, and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takuya et al. (JP 07-220734, see machine translation), as applied to claims 26 and 45 above, and further in view of Kato (US 6,054,230).

Regarding **claims 29 and 50**, Takuya discloses all of the claim limitations as set forth above. While Takuya discloses the method to manufacture a gas diffusion electrode, the reference does not explicitly disclose the method further comprising extruding the first paste and second paste prior to calendering *(rolling)*.

Kato disclose a method to make an electrode consisting of graphite particles (95 wt%) and PTFE resin particles (5 wt%) by conventional paste-forming methods in which the particulate materials were mixed together, lubricated, ram-extruded to form a tape, and calendered to form an electrode sheet **(C9/L4-7).**

Kato and Takuya are analogous because they are both concerned with the same field of endeavor, the making of an electrode.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine the ram-extruded process to form a tape prior to calendering, as taught by Kato, with the method of making a gas diffusion electrode, as taught by Takuya, for the purpose shaping the dough so the calendering process can be performed more easily because the dough has been more effectively distributed.

Regarding **claims 39 and 56**, Takuya discloses all of the claim limitations as set forth above. While Takuya discloses the method to manufacture a gas diffusion electrode, the reference does not explicitly disclose the method characterized in that the powder mixture which is agglomerated is 100 wt% graphite.

Kato discloses a method to make an electrode consisting of graphite particles (95 wt%) and PTFE resin particles (5 wt%) by conventional paste-forming methods in which the particulate materials were mixed together, lubricated, ram-extruded to form a tape, and calendered to form an electrode sheet **(C9/L4-7).** In other words, the powder mixture which is agglomerated is 100 wt% graphite and it is agglomerated with PTFE to form an electrode that is 95 wt% graphite and 5 wt% PTFE.

Kato and Takuya are analogous because they are both concerned with the same field of endeavor, the making of an electrode.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine the graphite particles of 95 wt% in an electrode, as taught by Kato, with the agglomeration with PTFE, as taught by Takuya, for the purpose of providing an electrode sheet that displays properties of high electroconductive and lower hydrophobicity.

11. Claims 30-31, 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takuya et al. (JP 07-220734, see machine translation), as applied to claims 26 and 45 above, and further in view of Takeuchi et al. (US 5,571,640).

Regarding **claims 30-31 and 51**, Takuya discloses all of the claim limitations as set forth above. While the reference discloses mixing the powder mixture and PTFE together **([0017])**, the reference does not explicitly disclose the method characterized in that the agglomeration is carried out using a ball mill.

Takeuchi discloses the method of making a cathode material for an electrochemical cell **(C3/L45-50)** wherein the ground cathode material is mixed with conductive diluents and a suitable binder material **(C3/L52-55).** A ball mill or vertical ball is preferred and typical grinding time ranges from between about 10 to 15 minutes **(C4/L63-65).** It is additionally disclosed that the finely divided cathode material is preferably mixed with carbon black and/or graphite as conductive diluents and a powder fluoro-resin such as PTFE powder as a binding material is used **(C4/L65-C5/L2).**

Takeuchi and Takuya are analogous because they are both concerned with the same field of endeavor, the manufacturing of a material for an electrochemical cell.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine the ball mill for grinding, as taught by Takeuchi, with the method of mixing an agglomeration of powders, as taught by Takuya, for the purpose of grinding and mixing powders together.

Further regarding **claims 31 and 51,** while the references do not explicitly disclose the method characterized in that the agglomeration is carried out using a ball mill and mixing for more than 30 minutes. As the operational cost of grinding and mixing and desired particle and agglomeration size are variables that can be modified, among others, by adjusting said mixing time, with said operational cost and desired particle or agglomeration size respectively increasing and decreasing, the precise mixing time cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the mixing time in the method of Takuya and Takeuchi to obtain the desired balance between the operational cost and the particle size (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller,* 105 USPQ 223). See MPEP 2144.

12. Claims 33 and 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takuya et al. (JP 07-220734, see machine translation) in view of Sauer (US 4,336,217), as applied to claim 32 above, and further in view of Plowman et al. (US 4,581,116).

Regarding **claim 33**, modified Takuya discloses all of the claim limitations as set forth above, but the reference does not explicitly disclose the method further comprising heating the first and second powder mixtures to a temperature between 50 and 200 degrees Celsius prior to said agglomerating.

Plowman teaches a gas diffusion composite electrode **(abstract)** to be used in a fuel cell **(C1/L1-10)**. Said gas diffusion composite electrode comprises carbon black material and PTFE **(C10/L55-65)**. Plowman additionally notes that the when the materials are in a powder form, the powders are held at a temperature of 50C prior to an agglomeration step **(C11/L13-16)**.

Plowman and Takuya are analogous because they are both concerned with the same field of endeavor, namely the manufacture of gas diffusion electrodes.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine the method of maintaining the powders at a temperature of 50C prior to the step of agglomeration, as taught in Plowman, with the method of making gas diffusion electrodes of Takuya, for the purpose of ensuring the powder materials are dry prior to the agglomeration of subjecting a dry powder of carbon and PTFE to blending, as taught by Sauer, with the method of preparing a dry agglomerate comprising carbon and PTFE, as taught by Takuya, for the purpose of having an agglomeration of dry carbon and PTFE without the need to filter and oven bake an agglomeration of carbon and PTFE from a dispersion.

Regarding **claim 52**, Takuya discloses all of the claim limitations as set forth above. While the reference discloses mixing the powder mixture and PTFE together **([0017])**, the reference does not explicitly disclose the method wherein said agglomerating comprises using a blender with blades rotating at between 1,000 and 3,000 rpm.

Sauer discloses a method of manufacturing a plastic bonded active carbon layer for thin gas diffusion electrodes **(C1/L5-8).** The method includes subjecting a dry mixture of active carbon and PTFE powder in a paddle mixture (1), prior to rolling and pressing, additionally to the intensive subdividing effect of rapidly rotating sharp knives (6) of a blender **(C1/L63-68)**. The rate of rotation of a motor **(7)** driving the knives **(6)** is disclosed of reaching a rate of rotation equal to about 3000 rpm **(C2/L27-30).**

Sauer and Takuya are analogous because they are concerned with the same field of endeavor, namely the manufacture of fuel cell electrodes.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine the blender with blades for mixing and grinding, as taught by Sauer, with the method of mixing an agglomeration of powders, as taught by Takuya, for the purpose of grinding and mixing powders together. Furthermore, as the reference is not limited to any specific examples of mixing and as blenders with blades were well known in the art at the time the invention was made, as evidenced by Sauer, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use any mixing device, including the blender with blades in the device of Sauer. Said combination would amount to use of a known element for its intended use in a known environment to accomplish entirely expected result.

The references do not explicitly disclose the method further comprising heating the first and second powder mixtures to a temperature between 50 and 200 degrees Celsius prior to said agglomerating.

Plowman teaches a gas diffusion composite electrode **(abstract)** to be used in a fuel cell **(C1/L1-10)**. Said gas diffusion composite electrode comprises carbon black material and PTFE **(C10/L55-65)**. Plowman additionally notes that the when the materials are in a powder form, the powders are held at a temperature of 50C prior to an agglomeration step **(C11/L13-16)**.

Plowman and Takuya are analogous because they are both concerned with the same field of endeavor, namely the manufacture of gas diffusion electrodes.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine the method of maintaining the powders at a temperature of 50C prior to the step of agglomeration, as taught in Plowman, with the method of making gas diffusion electrodes of Takuya, for the purpose of ensuring the powder materials are dry prior to the agglomeration of subjecting a dry powder of carbon and PTFE to blending, as taught by Sauer, with the method of preparing a dry agglomerate comprising carbon and PTFE, as taught by Takuya, for the purpose of having an agglomeration of dry carbon and PTFE without the need to filter and oven bake an agglomeration of carbon and PTFE from a dispersion.

13. Claims 35 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takuya et al. (JP 07-220734, see machine translation), as applied to claims 26 and 45 above, and further in view of Santilli et al. (US 5,651,813).

Regarding **claims 35 and 53**, Takuya discloses all of the claim limitations as set forth above, but the reference does not explicitly disclose in the method characterized in

that agglomeration is carried out using a high-speed mill with rotating blades which rotate at more than 10,000 rpm.

Santilli discloses a process of making ink jet inks including introducing a mixture into a mill, and milling the mixture until the pigment particle size is below 1.5 µm **(C2/L20-35)**. It is additionally disclosed that milling can take place in any suitable grinding mill including a ball mill but a high speed mill is preferred **(C3/L22-25).** The high speed mill can contain a rotating shaft with one or more impellers (blades) and it is disclosed that sufficient milling media velocity is achieved when the mill is operated at 9,000 rpm **(C3/L28-35).**

Santilli and Takuya are analogous because they are concerned with the similar problem of grinding and mixing a particle to a desired size.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine the high speed mixer, as taught by Santilli, with the method to agglomerate the particles, as taught by Takuya, for the purpose of making an agglomeration to a desired size via grinding.

Furthermore regarding the claim limitation of the speed at which the high speed mill is operated (e.g. "with rotating blades which rotate at more than 10,000 rpm"), as the operational cost of grinding and mixing and desired particle and agglomeration size are variables that can be modified, among others, by adjusting said rotation speed, with said operational cost and desired particle or agglomeration size respectively increasing and decreasing, the precise rotation speed cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized,

by routine experimentation, the rotation speed in the method of Takuya modified by Santilli to obtain the desired balance between the operational cost and the particle size (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller,* 105 USPQ 223). See MPEP 2144.

14. Claims 37 and 55 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takuya et al. (JP 07-220734, see machine translation), as applied to claims 36 and 54 above, and further in view of Gascoyne et al. (US 2002/0015879).

Regarding **claim 37 and 55**, Takuya discloses all of the claim limitations as set forth above. While Takuya discloses the method to stirring the dry agglomerate during the addition of the organic solvent, the reference does not explicitly disclose the method further comprising heating the first dry agglomerate during said stirring.

Gascoyne discloses an improved fuel cell anode structure **([0017])** wherein the anode structure the gas diffusion layer may contain carbon powder such as graphitised carbon, and a polymer such as PTFE **([0027])**. Gascoyne continues to disclose a dispersion of carbon-based component, specifically 30 weight parts of high surface area carbon black, and a catalyst component, specifically 100 combined weight parts of platinum and ruthenium catalyst **([0051]).** To this is added 10 weight parts of PTFE as a dispersion in water and the mixture is heated and stirred to entrain the PTFE particles within the carbon catalyst materials **([0051]).**

Gascoyne and Takuya are analogous because they are both concerned with the same field of endeavor, the making of an electrode for a fuel cell.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine the stirring while heating an aqueous dispersion of PTFE and carbon, as taught by Gascoyne, with the method of making a paste from an organic solvent and agglomerate, as taught by Takuya, for the purpose of entraining the PTFE particles within the carbon catalyst materials.

15. Claims 40-41, 43, 57, 59, and 67-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takuya et al. (JP 07-220734, see machine translation), as applied to claims 26, 45, and 61 above, and in view of Binder et al. (US 3,854,994), and further in view of Solomon (US 4,440,617).

Regarding **claims 40-41, 57, 59, and 68-69**, Takuya discloses all of the claim limitations as set forth above. While Takuya discloses the method to manufacture a gas diffusion electrode, the reference does not explicitly disclose the method wherein the first powder mixture forming the active layer comprises 27-75 wt% graphite with platinum, and 27-75 wt% graphite, nor comprising graphite with Ag, Co, Fe, perovskites or spinells.

Binder discloses a method of making a porous electrode having an electrically conductive electrocatalytically active layer and a contiguous gas permeable hydrophobic layer comprising polytetrafluoroethylene and carbon powder and graphite

fibers **(abstract).** To enhance the strength and electrical conductivity of the material, graphite fibers or commercial graphitic felt are added **(C4/L36-41).**

Binder and Takuya are analogous because they are both concerned with the same field of endeavor, the making of a gas permeable electrode.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine the graphite fibers or graphite felt, as taught by Binder, with the PTFE powder, as taught by Takuya, for the purpose of making a gas diffusion electrode with enhanced strength and electrical conductivity.

While the references disclose a gas diffusion electrode comprising PTFE and graphite, the references do not explicitly disclose the active layer comprising graphite with platinum, nor with Ag, Co, Fe, perovskites, or spinells.

Solomon discloses a method of making a non-bleeding gas electrode comprising a high surface area electroconductive carbon and PTFE **(abstract).** For the active layer, the concentration of PTFE in the electroconductive carbon/PTFE mix ranges from about 10 to 40 weight parts of PTFE and from about 60 to 90 weight parts of high surface area carbon to make up 100 weight parts of mix upon drying **(C8/L19-23).** It is additionally disclosed that platinum can be deposited on the active layer surface **(C9/L68-C10/L2),** or other precious metal catalysts such as silver can be deposited to enhance the catalytic activity of the carbon **(C10/L16-24).**

Solomon and Takuya analogous because they are both concerned with the same field of endeavor, the making of a gas electrode.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine the weight percent of the electroconductive carbon and catalyst metals including platinum and silver, as taught by Solomon, with the PTFE powder, as taught by Takuya, for the purpose of making a gas diffusion electrode with enhanced catalytic activity.

Regarding **claims 43, 58, 60, and 67**, modified Takuya discloses all of the claim limitations as set forth above, but the references do not explicitly disclose the gas diffusion layer comprising 55-75 wt% activated carbon or graphite and 25-45 wt% PTFE.

For the gas diffusion layer, Binder discloses a method of making a porous electrode having an electrically conductive electrocatalytically active layer and a contiguous gas permeable hydrophobic layer comprising polytetrafluoroethylene and carbon powder and graphite fibers **(abstract, C3/38-43).** To enhance the strength and electrical conductivity of the material, graphite fibers or commercial graphitic felt are added **(C4/L36-41).**

Binder and Takuya are analogous because they are both concerned with the same field of endeavor, the making of a gas permeable electrode.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine the graphite fibers or graphite felt, as taught by Binder, with the PTFE powder, as taught by Takuya, for the purpose of making a gas diffusion layer with enhanced strength and electrical conductivity.

Regarding the limitation of the weight percent of the activated carbon or graphite and PTFE in the gas diffusion layer (e.g. "the gas diffusion layer comprising 55-75 wt% activated carbon or graphite and 25-45% wt% PTFE"). As the electroconductivity and hydrophobicity are variables that can be modified, among others, by adjusting said weight percents, with said electroconductivity and hydrophobicity increasing and decreasing respectively with an increase in the weight percent of activated carbon or graphite, the weight percent cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the weight percents of activated carbon or graphite and PTFE in the method of Takuya modified by Binder and Soloman to obtain the desired balance between the electroconductivity and hydrophobicity (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller,* 105 USPQ 223). See MPEP 2144.

16. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takuya et al. (JP 07-220734, see machine translation), as applied to claim 26 above, and further in view of Plowman et al. (US 4,581,116).

Regarding **claim 44**, Takuya discloses all of the claim limitations as set forth above. While the reference discloses mixing the powder mixture and PTFE together **([0017])**, the reference does not explicitly disclose the method further comprising drying the gas diffusion electrode at a temperature less than 40 degrees Celsius.

Plowman teaches a gas diffusion composite electrode **(abstract)** to be used in a fuel cell **(C1/L1-10)**. Plowman discloses that in the process, the lamination of the active layer, current collector, and backing layer *(gas diffusion layer)* is followed by a drying step to remove the organic solvent **(C11/L68-C12/L2)**. Therefore, as Plowman discloses that excess organic solvent may remain in the gas diffusion electrode after the calendering step, it would have been obvious to one having ordinary skill in the art at the time of invention to include a drying step after the calendering step as taught by Plowman with the manufacturing method of Takuya for the purpose of removing excess organic solvent.

While the references do not disclose the drying step at a temperature less than 40 degrees Celsius, the operational cost of drying or removing a solvent from a mixture and drying rate are variables that can be modified, among others, by adjusting said temperature of drying, with said operational costs and drying rate both increasing with an increase of temperature, the precise temperature cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the temperature of drying in the method of Takuya to obtain the desired balance between the operational cost and the drying rate (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller,* 105 USPQ 223). See MPEP 2144. Additionally, one of ordinary skill in the art would recognize the ability of air drying said electrode at ambient temperature.

Response to Arguments

17. Applicant's arguments with respect to claims 26-69 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob Buchanan whose telephone number is (571)270-1186. The examiner can normally be reached on Monday - Friday 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on (571)272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. B./
Examiner, Art Unit 1725

/Basia Ridley/
Supervisory Patent Examiner, Art Unit 1725